THE UNIVERSITY OF BRITISH COLUMBIA

Food 522: Advances in Food Chemistry

Tuesday/ Thursday 9:00 – 10:30, Room 30 FNH Building

Instructor: Christine Scaman 822-1804 FNH Building Rm 247
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Office Hours: I do not have formal office hours, but will arrange individual meetings at a mutually convenient time. Please contact me to arrange a time to meet.

Course Description

This course will be divided into 4 modules. Each module will focus on a single topic of current interest/concern for a major or minor component of foods – carbohydrates, lipids, proteins, and a topic that will change from year to year (i.e. antioxidants, flavour). By focusing on only one topic for each component, you will gain depth in that topic, and a mechanistic understanding of the chemistry involved.

It is expected that students will have a background in food chemistry equivalent to that taught at an undergraduate level, and this course will build on that food chemistry core. Extra readings can be made available to students who are missing all or part of this background, and it is their responsibility to do this reading on their own.

Course Format

The course will use a "Team-Based Learning" approach. You will work with your assigned team members (4-5 students/team) for the term. Teams will be formed during the first class. For each module, you will be assigned reading material and I will be giving a lecture covering important concepts. As you go through the assigned readings, you should make a note of material that is unclear. You can ask your questions in your group or to me, or submit your questions via e-mail.

You will be given a short "Readiness Assessment Quiz" (RAQ) that will be completed as an individual, and then as a team, to evaluate your understanding of the background information. The RAQ will be based on the lecture material, and will focus on broad concepts, rather than specific details.

Once the background information has been introduced, you will work in your team to solve a related problem. All teams will work on the same problem and you will be given class time for this activity. I **very strongly** recommend **against** dividing up the problem into different components, and compiling the information obtained by different group members. Rather, use the class time to allow discussion among all group members. It will be useful to bring a laptop to class to search for additional information related to the problem.

During one of the classes, all teams will present their analysis/solution to the assigned problem. Each team will be given an opportunity to assess the information presented by the other team, and there will be a general class discussion of the problem/solutions with each group presenting

their information followed by class discussion.

General Learning Outcomes
Upon successful completion of this course, students will:

- Achieve in-depth knowledge in specific areas of food chemistry covered in each module
- Develop effective communication skills required for team work
- Become familiar with using data resources available
- Gain practice with integrating information from different sources
- Develop skills in critical evaluation of information
- Gain practice in providing constructive evaluation of peer work

Course Evaluation

Individual Assessment (48%)
12% Individual Readiness Assurance Quizzes (4 @ 3% each)
36% Final Exam (in exam period) The exam will be open book, and may be oral.

Team Assessment (52% - with a "Peer factor")
12% Team Readiness Assurance Quiz (4 @ 3% each)
40% Team Work on Problems /Presentations (5 @ 8% each)

A **Peer Factor** will be calculated using the percentage method. Each team member will complete the peer evaluation form, without evaluating themselves for each module. Each team member will be given a score, so that the total score for all team members will equal 100. I will add the scores that your team members give you. A team member who contributes a lot will receive a score >100, while a member who contributes less will receive a score <100. This score will become a multiplier for the team-based portion of the course.

For example, if you receive a peer evaluation of 80% from your team, and your team assessment is 45% out of a possible 52%, then you will receive (.8)(45) = 36/52 for the team-based portion of the course.

Academic Integrity

The integrity of academic work depends on the honesty of all those who work and study at the univerisity and the acknowledgement of the work of others through careful citation of all sources used in your work. Plagiarism and other forms of academic misconduct are treated as serious offences at UBC, whether committed by faculty, staff, or students.

You should be aware of the sections of the University Calendar that address academic integrity (http://www.students.ubc.ca/calendar/index.cfm?tree=3,286,0,0) and plagiarism (http://vpacademic.ubc.ca/integrity/ubc-regulation-on-plagiarism/). The UBC library also has a useful web-based Plagiarism Resource Centre (www.library.ubc.ca/home/plagiarism/) that explains what plagiarism is and how to avoid it. The copying of passages from any sources, without proper reference will be considered plagiarism. **This includes copying of material from another student without acknowledging the source.** If you have questions or concerns about any of these policies or conventions in relation to how they apply to the work you do in this course, please discuss them with me.

Course Schedule

Week	Module 1:	Tuesday	Thursday
Week 1 Sept 2,4	*Course introduction*	Course Introduction Trial RAQ Lecture Assign review paper	Hand in paper review Paper review discussion Lecture (con't from Tues) Class time for problem
Week 2 Sept 9,11	*Problem #1*	RAQ-Individual /Team Lecture for clarification Class time for problem	Class time for problem
Week 3 Sept 16,18	*Problem #1*	Class time for problem	Presentations and group discussion
Week	**Module 2: Proteins**	**Tuesday**	**Thursday**
Week 4 Sept 23,25	*Introduction*	Lecture/Readings	RAQ – Individual / Team Lecture for clarification
Week 5 Sep30/Oct2	*Problem #2*	Class time for problem	Class time for problem
Week 6 Oct 7, 9	*Problem #2*	Class time for problem	Presentations and group discussion
Week	**Module 3: Polysaccharides**	**Tuesday**	**Thursday**
Week 7 Oct 14,16	*Introduction*	Lecture/Readings	RAQ – Individual / Team Lecture for clarification
Week 8 Oct 21.23	*Problem #3*	Class time for problem	Class time for problem
Week 9 Oct 28,30	*Problem #3*	Class time for problem	Presentations and group discussion
Week 10 Nov 4, 6	*Introduction*	Lecture/Readings	RAQ – Individual / Team Lecture for clarification
Week	**Module 4: Lipids**	**Tuesday**	**Thursday**
Week 11 Nov 11,13	*Problem #4*	*No class – Remembrance Day*	Class time for problem
Week 12 Nov 18, 20	*Problem #4*	Class time for problem	Class time for problem
Week 13 Nov 25, 27	*Problem #4*	Class time for problem	Presentations and group discussion

A final exam will be scheduled during the regular exam period

Example Module- Carbohydrates: Bread Staling

Content Specific Learning Outcomes
After completing the readings and problem, you should:

- Understand the role of starch in bread structure
- Be aware of the physical and chemical changes that occur during bread staling
- Be familiar with methodology that can be used to assess bread structure/staling
- Develop an understanding of the mechanism of how amylase, hydroxypropylated starch, and beta-cyclodextrins can prevent bread staling

Problem: Compare the use of the following three approaches to reducing bread staling

- Alpha amylase-treated wheat flour
- hydroxypropylated (but NOT cross-linked) starch as an ingredient in breadmaking
- addition of beta-cyclodextrin

During the next class, each group will post their answers to the following questions at the same time. The answers can be handwritten or from a computer file. All groups will have approximately 20 minutes to view the other teams' posters. Then each group will be given 5 minutes to present their answers followed by discussion from the other groups.
Each group will post answers to the following questions:

1. How does starch contribute to the structure of bread?
2. How does each amylose and amylopectin affect bread staling
3. What are 2 techniques used to assess bread staling experimentally?
4. What is the mechanism by which the treatments listed above may inhibit bread staling?
5. Which method is the most effective and practical to inhibit bread staling commercially?

Marking Scheme
10% - Posted answers to questions and oral presentation – inclusion of all aspects of the problem, originality, practicality, depth of understanding of the relevant concepts.

- 2% for each question

Bonus points - Contribution to group discussion

Readings
The following readings may be useful and can be accessed through the UBC Library.

- Bread Staling: Molecular Basis and Control J.A. Gray and J.N. Bemiller Comprehensive Reviews in Food Science and Food Safety 2 (1): 1-21 2003 http://www3.interscience.wiley.com/journal/118855906/abstract

- Antifirming Effects of Starch Degrading Enzymes in Bread Crumb Hans Goesaert, Pedro Leman, Annabel Bijttebier, Jan A. Delcour Journal of Agricultural and Food Chemistry 2009 57 (6), 2346-2355 (http://pubs.acs.org/doi/abs/10.1021/jf803058v)

- Lovedeep Kaur, Narpinder Singh, Jaspreet Singh, Factors influencing the properties of hydroxypropylated potato starches, Carbohydrate Polymers, Volume 55, Issue 2, 22 January 2004, Pages 211-223, ISSN 0144-8617, DOI: 10.1016/j.carbpol.2003.09.011. (http://www.sciencedirect.com/science/article/B6TFD-4B4YYSD-1/2/8bd1789aed7e54bb689bb4da9baf8cb1)

- Beta-Cyclodextrin: A new approach in bread staling, Y.Q. Tian, Y. Li, Z.Y. Jin, X.M. Xu, J.P. Wang, A.Q. Jiao, B. Yu, T. Talba, Thermochimica Acta, 489, (1-2) 2009, 22-26 (http://www.sciencedirect.com/science/article/B6THV-4VJ038H-1/2/8100c90f8a1efa83c0cc4e2923ff90d8)

- Model approach to starch functionality in bread making Hans Goesaert, Pedro Leman, and Jan A. Delcour J. Agric. Food Chem. 2008, 56, 6423-6431 http://pubs.acs.org/doi/full/10.1021/jf800521x

- Recent advances in application of modified starches for breadmaking Trends in Food Science & Technology 17(11), 2006, 591-599 (http://www.sciencedirect.com/science/article/B6VHY-4KD5BSX-2/2/9e6a08e255ac3eb93a7a60e59f55b739